PROJECT CRASHING IN CONSTRUCTION INDUSTRY: INVESTIGATION OF THE STRATEGIES, CHALLENGES AND IMPACTS

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ABSTRACT

This survey is conducted to study the project crashing in the aspect of the strategies and challenges in construction industry. Besides, this study also identified the impacts on cost, time and quality once the strategies are being implemented. The objectives of this study were to identify the strategies that can crash a project successfully, to identify the challenges in project crashing and to examine the relationship between the strategies used in project crashing and the impacts in terms of cost, time and quality. The data are obtained mainly from the primary data which is the survey questionnaires. Total sample of 54 respondents were used in this study. The result of this study has identified the suitable strategies to crash a project, the challenges faced in project crashing and also see the impact of the strategies used in terms of cost, time and quality.

ABSTRAK

Kajian ini dijalankan untuk mengkaji ‘project crashing’ dari aspek strategi dan cabaran di dalam industri pembinaan. Selain itu, kajian ini juga turut mengenal pasti kesan perlaksanaan strategi ke atas kos, masa dan kualiti. Objektif kajian ini adalah untuk mengenalpasti strategi yang boleh menjayakan ‘project crashing’, mengenal pasti cabaran-cabaran di dalam ‘project crashing’ dan untuk mengkaji hubungan di antara strategi yang digunapakai di dalam ‘project crashing’ dan kesannya dari segi kos, masa dan kualiti. Data diperoleh berdasarkan data primer iaitu melalui boring kaji selidik. Sebanyak 54 sampel responden telah diselidik di dalam kajian ini. Hasil kajian ini telah mengenal pasti strategi yang sesuai untuk ‘project crashing’, cabaran yang dihadapi dalam melaksanakan ‘project crashing’ dan juga melihat kesan penggunaan strategi dari segi kos, masa dan kualiti.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The title of this research is project crashing in construction industry: investigation of the strategies, challenges and impacts. This chapter includes the problem background, problem statement, research objectives, research questions, scope of the study, hypothesis, significance study, operational definitions and expected results.

1.2 PROBLEM BACKGROUND

A project is a sequence of task and activities that is planned from the beginning until the end. The Project Management Institute (PMI) states that a project is an interim group works that is formed to produce a unique product or services. A project has a several characteristics for example temporary. The temporary of a project can be defined as something that has a beginning and end in time. When the goals or the objectives of the project are achieved, it indicates that the project has come to its end or in other word, success. Frimpong, Oluwoye and Crawford (2003) states that a project is consider success when the project has achieved its technical performance, maintained its schedule or behind schedule and managed to remain within budgetary costs. This situation proves that the project is something that is planned all along and the works or activities done in the project is by pursuing the objectives or goals.

The person responsible in managing the project is known as project manager. A project manager must know about the project management. This is because he is responsible for managing the project until they achieved their goals. Project

management is not the same as project. Project management is the ability to use the knowledge, skills and techniques to carry out the projects effectively and efficiently. A quality project management can be evaluate through the management tools and techniques used to manage the project (Frimpong *et al,* 2003). In addition, Oisen (1971) states that project management is the application of a set of tools and techniques to guide the use of diverse resources toward the achievements of a unique, complex, one-time task within the triple constrains that are time, cost and quality constraints.

In reality, the trend in construction industry nowadays is that many projects could not be finished on time. This situation is known as projects delayed. Project construction delays is viewed as one of the most common problems that may lead to a various of negative effects on the project and also the parties involved in it (El-Razek, Bassioni, and Mobarak , 2008). Project delayed can be defined as the failure to finish up the activities within the time given. The project delay can greatly affects the whole projects as well as affects the overall cost of the projects and also the companies' reputation. Ogunlana, Promkuntong and Jearkjirm (1996) states that delays in construction projects will usually affects the time and cost of the projects. The projects delay may occur due to the lack of resources, insufficient budgets, inexperience project managers, problems in resources shipment and many more.

However, to counter this problem, a project manager has one escape route to deliver projects on time that is project crashing. A project crashing is a method where projects duration is shortening by reducing the time of the activities to less than its initial activity time at a certain amount of cost. The target of the project crashing was to minimize the required cost while meeting a specified deadline. For it to be effectives, a project crashing is only done on the critical activities in the project. Lima, Silva, and Vieira (2006) state that project crashing is basically an evaluation of the costs of reducing the duration of vital tasks that is located in the critical path.

This study is to highlight about the strategies of project crashing, challenges of the project crashing and the impacts of the strategies used in project crashing in terms of cost, time and quality constraints.

1.3 PROBLEM STATEMENT

In a construction industry, project managers are bound to the triple constraints that are schedule, cost and scope of the projects. These three criteria works in tandem with one another. Once a project manager fully understand about the triple constraint and knows how to handle with triple constraints, then only the project manager can achieve a successful and a quality projects. This is because the projects are being measured by these constraints and it is the key element towards a success projects, just like stated in the research by Schwalbe (2007) that in order to have a successful project, a project manager must put extra efforts in maintaining the scope, time and cost and maintained these three often-competing attributes. In the triple constraints, the element of schedule or commonly known as time is always a big threat to a project manager and it will always affects the cost element. This is because the longer the time of the project is, the higher the cost of the projects will be.

In construction industry, a project manager will face many unexpected problems that will force him to delay certain activities that will directly affect the projects duration. The project delay will be a serious problem for the project. Not only that, according to Al-Khalil and Al-Ghafly (1999), the projects delay will also cost not only the owner, but also the contractor where the owner will missing out on the possible incomes of cash flow from the use of the project and from the increased overhead cost for contract administration and supervision. Meanwhile, the contractor will loses due to increased costs in overhead and tied-up capital. Plus, it also includes the lost of opportunities for new projects due to the low financial capabilities.

In a situation where the manager cannot afford to encounter projects delay, the project manager will resort to every option that they have in hands. One of it is project crashing. A project crashing is a method of shortening the duration of the whole project by adding more resources to a certain activity. Although project crashing is one way to overcome projects delay, it is not a simple task and it is necessary to know how to handle and manage project crashing. This is because if the manager crash a non critical activity, it will be pointless as the project crashing is only effective on the critical activities. According to Kuhl and Tolentino (2008), the crashing method is focused on

minimizing the time of the activities on the critical path. A critical path is the one that can cause a delay of the project because there is no slack time on the critical path. A manager should know the strategies to successfully crashing a project.

Besides that, a manager should also know the challenges that they may face in order to implement the project crashing successfully. According to the triple constraints law, by shortening the duration of the project, the cost of the projects will be increased. This is because more resources are being assigned to the critical activities so that the activities will complete sooner than the initial assigned duration. The increased of one of the triple constraints will affect the other constraints. This will overall affect the project quality. Babu and Suresh (1996) believed that depending on the project crashing, the project quality may be affected.

As project crashing is a good factor for contractor and manager, it is viewed differently for other parties such as developer or consultant. Depending on the strategies used to implement the project crashing, it may results in either good impacts or bad impacts to the parties involved. A contractor may view the project crashing as a good factor if using the right strategies and methods as it helps the contractor to deliver the projects on time, but things are viewed differently for developer and consultant.

Furthermore, this research is conducted in order to exposed more about project crashing because there were less discussion about this topic and lack of exposure about the project crashing. The topic is quite general but then again, if asked about the project crashing, there are still a lot of people that does not know the term project crashing.

1.4 RESEARCH OBJECTIVES

1 To identify the strategies that can crash a project successfully

2. To identify the challenges in project crashing

3. To examine the relationship between the strategies used in project crashing and the impacts in terms of cost, time and quality.

1.5 RESEARCH QUESTIONS

1 What are the strategies that can crash a project successfully?

2. What are the challenges faced in project crashing?

3. Which constraints give more impacts on the strategies used in crashing a project?

1.6 SCOPE OF THE STUDY

The scope of this research is to find out the strategies, challenges and impacts of project crashing. So, this research will focuses on construction industry that includes contractors with G7 contracting license, developers and consultant in Kuantan area. The companies for contractors are picked from the registered companies under Construction Industry Development Board Malaysia (CIDB) while for the developers companies are selected from the companies that are registered under the Real Estate and Housing Developers' Association Malaysia (REHDA). The research is conducted in Kuantan area because Kuantan is the capital city of Pahang and it is the focus place of the public. Hence, it will be easier to approach the construction companies that hold a bigger status which usually place their office in the capital city. This targeted population is chosen because bigger company usually implement project crashing method.

1.7 HYPOTHESIS

H1: There is relationship between the strategies used and impacts of project crashing in terms of cost, time and quality.

1.8 SIGNIFICANCE OF THE STUDY

This research will enlighten people about the strategies that can successfully implement the project crashing. A successful project crashing can ensure that the projects to be finished within due date. Plus, a neat and careful planning might actually finished up the projects with lower costs. This research also identifies the challenges of project crashing in construction industry. By studying the challenges, people involved

such as contractor, developer, general worker and consultant will be more prepared and ready to implement the project crashing. Plus, this research will enlighten people about the impacts of project crashing towards the strategies used in terms of cost, time and quality. The impacts will be differently for each of the strategies used in implementing project crashing. As this research is being carried out, the opinion of the parties involved can be seen and evaluate. In a nutshell, this research is carried out to give more exposure on the project crashing.

1.9 OPERATIONAL DEFINITION

In this research, the formula of obtaining the sample size is referred to the Israel's journal which is:

$$n = \frac{N}{1 + N\,(e)^2}$$

n = Sample Size
N = Population Size
e = The Level of Precision (Sampling Error)

Figure 1.1: Formula for Sample Size

1.10 EXPECTED RESULT

The final results of this research will expose and highlight more about the project crashing in construction industry. By knowing the right strategy to implement the project crashing, the problem such as project delay or could not finished the project on time can be overcome. Furthermore, if the right strategy is known, the contractor might do the right call to spur his worker's spirit and motivation. Plus, the respondents might actually suggest a new idea or opinion regarding this research that will be very valuable and helpful. Their experience in the real situation is considered to be very important for this research. Besides that, by knowing the challenges of the project crashing, people will be mentally and physically more prepared to carry out the project crashing. This is because they may have an idea of what to be faced in implementing the

project crashing. Furthermore, the relationship between the strategies used and the impacts in terms of cost, time and quality may also be identified. This will enable the researcher to see what is the impacts if when using the strategies to crash a project. Not only that, it will also provide the situation where three different points of view are being reviewed regarding the same topic that is the project crashing. By studying the impacts that it could bring, the contractor, developer or consultant might as well takes a precautionary step to avoid any ugly circumstances when implementing the project crashing. The final results of this research will also be a source and material for future researcher regarding the project crashing.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will covers about the research objectives. The detailed explanation are being discussed on the project crashing that includes the strategies that can crash a project successfully, the challenges in implementing the project crashing, the impacts of the strategies used in implementing project crashing and also the theoretical framework indicating the relationship between independent variable and dependent variable. For the purpose of acquiring more knowledge, the importance of time, triple constraint and project delay are also discussed in this chapter.

2.2 IMPORTANCE OF TIME IN CONSTRUCTION

Time is very essential especially in construction industry. This is because time can indicate the start or end of a project. It can also lead to several situation such as project delay, project success or even deciding whether to use the project crashing method or not. For that, time is something that the project manager, contractor, developer, consultant and also the clients need to be wary of. For the clients and developer, they would prefer shorter time in a project compared to project manager and contractor. Sometimes, the project may be a bit difficult for them to manage that they required more spaces and time to deliver the projects.

Apart from that, the time management can be the key in determining the reputation of a company. If a company is always deliver the project within time, the reputation of the companies will be good in the eyes of a client compared to the

company that does not handle their time management so well. Given the situation where the client had to choose between the company that manage to run their past projects well and within time with another company that failed to run their past projects within time, the client would certainly choose the company that have a good reputation that is the one that manage to run their projects well and within the time given.

Time management can be defined as to make use the time available to its best or early preparation and planning for facing a certain situation. Failed in time management can lead to a situation that will cost the person or groups. Ordonez and Benson (1997) states that time constraint exists whenever there is a duration given until deadline, even if it means that the person is able to complete the task in less time. Among the failed situation is bankrupt, project termination, projects delay or to pay penalties for failing to deliver the projects on time or known as Liquidated Ascertain Damages (LAD). The importance of time has made it as one of the triple constraints along with cost and scope. This just shows how important time is in a project.

2.3 CONSTRUCTION INDUSTRY

Construction industry is a work field that involves all the works that relate to the constructing such as designing, negotiating, maintenance and many more. It purposes is to make a better life for people and also to create a place where normal people can live their daily life perfectly. Yang (2007) states that a construction project is a set of individual activities and they have their inter-precedence constraints.

2.3.1 Contribution of construction industry globally

Nowadays, almost all area in the world has their construction industry taking place. Construction involves from the manual constructing such as the simple housing constructed by using fronds and tree branches, to the complex constructing that is the using of machinery and equipment. Construction industry plays a major role in determining a countries reputation and standard. It is one of the criteria that will determine the countries development. For instance, the first world country such as America has a quite a lot of spectacular building and landscape. It is part of the

construction that makes the countries seen as a remarkable place. Not to mention, the infrastructure also have a role in determining the development of a country.

2.3.2 Contribution of construction industry towards Malaysia

In Malaysia, the same thing happened. Construction industry has successfully upheld the national's reputation and name. This can be seen through the construction in several national's landmark such as Petronas twin towers or KLCC, KL tower, Penang Bridge, Putrajaya and many more. The construction of these landmarks indicates that the developments in construction industry in Malaysia can be on par as the construction industries on other develop countries.

The Petronas twin towers or Kuala Lumpur Conventional Centre (KLCC) is one of the tallest buildings in the world. From 1998 until 2004, it holds the status of the world's tallest building. On the other hand, the Penang Bridge is the Asia's world largest bridge that is 14 km. The bridge that connects to the Penang Island also became the national's proud achievement.

In the construction of these magnificent buildings and bridge, there are also several issues that occurred. Same situation with other project that is being run, the construction of these landmarks also faces the difficulties and issues that give headache and problems to the parties that involved in the construction. Among them is the project delay.

2.4 PROJECT DELAY

In managing a project, the risk of getting the project delay is very high. Project delay can be defined as the late finished of a certain projects. Projects delay is a situation where the project cannot be completed under the planned time (Azlan Shah Ali *et al*, 2010). There are many causes of project delay. One of them is the failure to manage the triple constraint. The triple constraint consists of time, cost and scope. Other causes of project delay includes the changes of scope, changes in contracts, stakeholder's involvement, weather and many more.